

## HISTOLOGY OF SKIN:

The human skin is the outer covering of the body. In humans, it is the largest organ of the integumentary system. The skin has up to seven layers of ectodermal tissue and guards the underlying muscles, bones, ligaments and internal organs. Human skin is similar to that of most other mammals. Though nearly all human skin is covered with hair follicles, it can appear hairless. There are two general types of skin, hairy and glabrous skin (hairless). The adjective cutaneous literally means "of the skin" (from Latin *cutis*, skin).

Because it interfaces with the environment, skin plays an important immunity role in protecting the body against pathogens and excessive water loss.<sup>[4]</sup> Its other functions are insulation, temperature regulation, sensation, synthesis of vitamin D, and the protection of vitamin B floats. Severely damaged skin will try to heal by forming scar tissue. This is often discolored and DE pigmented.

In humans, skin pigmentation varies among populations, and skin type can range from dry to oily. Such skin variety provides a rich and diverse habitat for bacteria that number roughly 1000 species from 19 phyla, present on the human skin. 1Structure

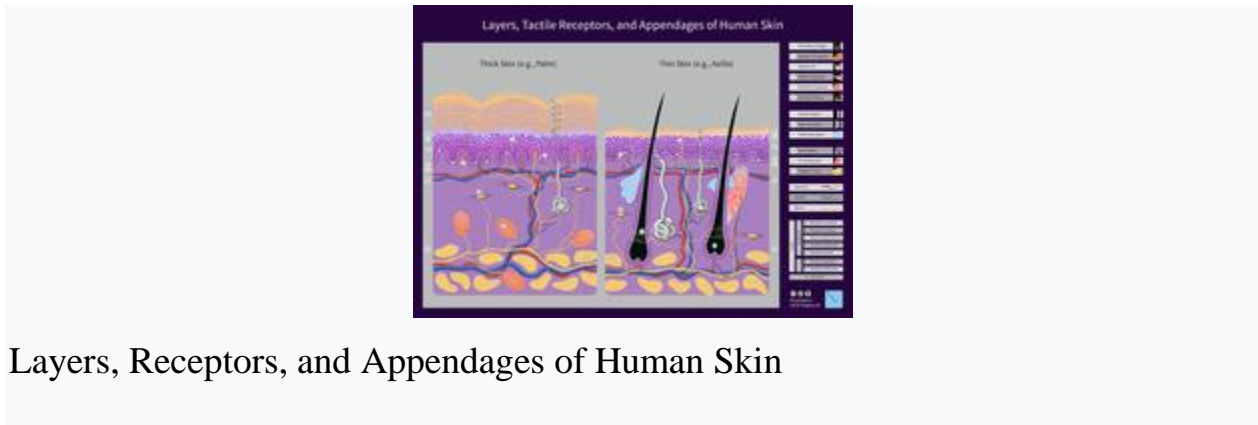
### Structure of skin:

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Skin has mesodermal cells, pigmentation, such as melanin provided by melanocytes, which absorb some of the potentially dangerous ultraviolet radiation (UV) in sunlight. It also contains DNA repair enzymes that help reverse UV damage, such that people lacking the genes for these enzymes suffer high rates of skin cancer. One form predominantly produced by UV light, malignant melanoma, is particularly invasive, causing it to spread quickly,

and can often be deadly. Human skin pigmentation varies among populations in a striking manner. This has led to the classification of people(s) on the basis of skin color.

The skin is the largest organ in the human body. For the average adult human, the skin has a surface area of between 1.5-2.0 square meters (16.1-21.5 sq ft.). The thickness of the skin varies considerably over all parts of the body, and between men and women and the young and the old. Skin is composed of three primary layers: the epidermis, the dermis and the hypodermis.



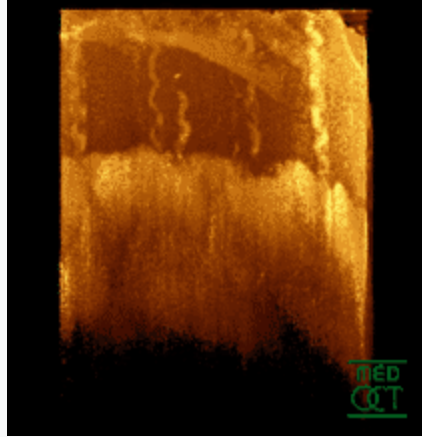
## Layers, Receptors, and Appendages of Human Skin

### Epidermis[

#### *Main article: Epidermis*

Epidermis, "epi" coming from the Greek meaning "over" or "upon", is the outermost layer of the skin. It forms the waterproof, protective wrap over the body's surface which also serves as a barrier to infection and is made up of stratified squamous epithelium with an underlying basal lamina.

The epidermis contains no blood vessels, and cells in the deepest layers are nourished almost exclusively by diffused oxygen from the surrounding air<sup>[10]</sup> and to a far lesser degree by blood capillaries extending to the outer layers of the dermis.



2D projection of a 3D OCT-tomogram of the skin at the fingertip, depicting the stratum corneum (~500  $\mu\text{m}$  thick) with the stratum disjunctum on top and the stratum lucidum in the middle. At the bottom are the superficial parts of the dermis. The sweat ducts are clearly visible. (See also: Rotating 3D Version)

### Components

The epidermis contains no blood vessels, and is nourished by diffusion from the dermis. The main type of cells which make up the epidermis are keratinocytes, melanocytes, Langerhans cells and Merkel cells. The epidermis helps the skin to regulate body temperature.

### Layers

Epidermis is divided into several layers where cells are formed through mitosis at the innermost layers. They move up the strata changing shape and composition as they differentiate and become filled with keratin. They eventually reach the top layer called *stratum corneum* and are sloughed off, or desquamated. This process is called *keratinization* and takes place within weeks. The outermost layer of the epidermis consists of 25 to 30 layers of dead cells.

- Stratum corneum
- Stratum lucidum

- Stratum granulosum
- Stratum spinosum
- Stratum germinativum (also called "stratum basale").

Blood capillaries are found beneath the epidermis, and are linked to an arteriole and a venule. Arterial shunt vessels may bypass the network in ears, the nose and fingertips.

Genes and proteins expressed in the epidermis[edit]

About 70% of all human protein-coding genes are expressed in the skin.<sup>[11][12]</sup> Almost 500 genes have an elevated pattern of expression in the skin. There are less than 100 genes that are specific for the skin and these are expressed in the epidermis.<sup>[13]</sup> An analysis of the corresponding proteins show that these are mainly expressed in keratinocytes and have functions related to squamous differentiation and cornification.

Dermis[edit]

*Main article: Dermis*

The dermis is the layer of skin beneath the epidermis that consists of epithelial tissue and cushions the body from stress and strain. The dermis is tightly connected to the epidermis by a basement membrane. It also harbors many nerve endings that provide the sense of touch and heat. It contains the hair follicles, sweat glands, sebaceous glands, apocrine glands, lymphatic vessels and blood vessels. The blood vessels in the dermis provide nourishment and waste removal from its own cells as well as from the Stratum basale of the epidermis.

The dermis is structurally divided into two areas: a superficial area adjacent to the epidermis, called the *papillary region*, and a deep thicker area known as the *reticular region*.

### Papillary region[edit]

The papillary region is composed of loose areolar connective tissue. It is named for its fingerlike projections called *papillae*, that extend toward the epidermis. The papillae provide the dermis with a "bumpy" surface that interdigitates with the epidermis, strengthening the connection between the two layers of skin.

In the palms, fingers, soles, and toes, the influence of the papillae projecting into the epidermis forms contours in the skin's surface. These epidermal ridges occur in patterns (*see*: fingerprint) that are genetically and epigenetically determined and are therefore unique to the individual, making it possible to use fingerprints or footprints as a means of identification.

### Reticular region[edit]

The reticular region lies deep in the papillary region and is usually much thicker. It is composed of dense irregular connective tissue, and receives its name from the dense concentration of collagenous, elastic, and reticular fibers that weave throughout it. These protein fibers give the dermis its properties of strength, extensibility, and elasticity.

Also located within the reticular region are the roots of the hairs, sebaceous glands, sweat glands, receptors, nails, and blood vessels.

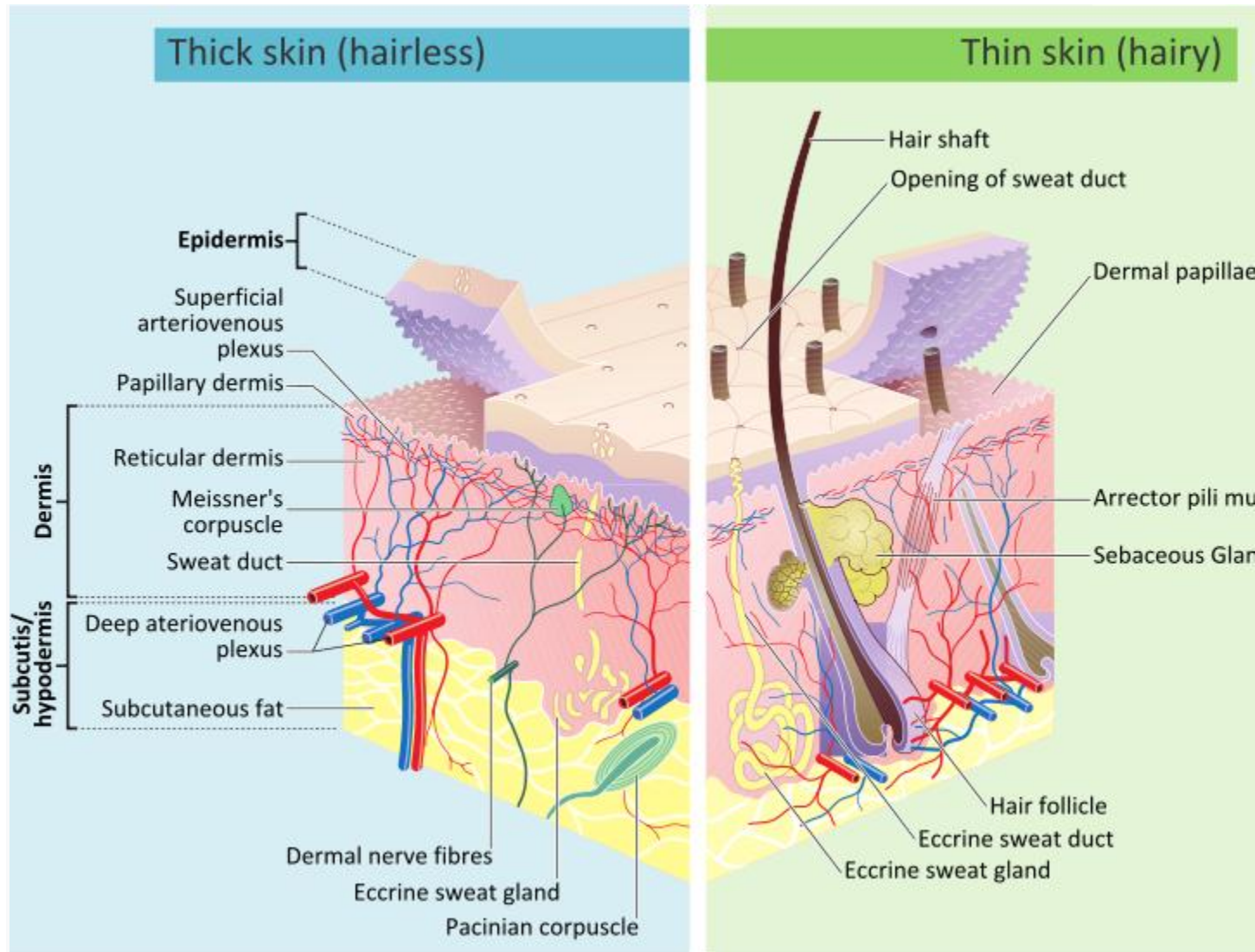
Tattoo ink is held in the dermis. Stretch marks often from pregnancy and obesity, are also located in the dermis.

### Subcutaneous tissue[edit]

The subcutaneous tissue (also *hypodermis* and *subcutis*) is not part of the skin, and lies below the dermis of the cutis. Its purpose is to attach the skin to underlying bone and muscle as well as supplying it with blood vessels and nerves. It consists of loose connective tissue, adipose tissue and elastin. The main cell types

are fibroblasts, macrophages and adipocytes (subcutaneous tissue contains 50% of body fat). Fat serves as padding and insulation for the body.

Cross-section[edit]



Skin layers, of both hairy and hairless skin